

# PATENT ABSTRACTS OF JAPAN

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## (54) PRODUCTION OF MAGNETIC RECORDING MEDIUM

### (57)Abstract:

**PROBLEM TO BE SOLVED:** To rapidly and surely disperse fine particulate powder by executing a dispersing stage after kneading the particulate powder and a binder by a sand mill selected with a bead packing amount within a specific range.

**SOLUTION:** The production stage for a coating material for magnetic recording media containing at least the particulate powder and the binder has a kneading stage for kneading the particulate powder and the binder and the subsequent dispersing stage. In the dispersing stage, the bead packing amount is selected at 40 to 70%, preferably, 50 to 60% (both by volume, i.e., the ratio to the inside volume of a vessel where the prescribed dispersing is executed) and the dispersing is executed by the sand mill. The diameter of these beads is preferably confined within a range of 0.5 to 1.2 mm. The circulating flow rate of the sand mill in the dispersing stage is preferably set at 13 to 20 liter/ minute.

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**CLAIMS**

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[Claim(s)]

[Claim 1] The manufacture approach of a magnetic-recording medium that it has the kneading process which kneads the above-mentioned particle fine particles and a binder, and a subsequent distributed process in the production process of the coating for magnetic-recording media which has particle fine particles and a binder at least, and this distributed process is characterized by being based on the sand mill from which the bead fill was selected to 40% - 70% (volume ratio).

[Claim 2] The above-mentioned bead is the manufacture approach of the magnetic-recording medium according to claim 1 characterized by making the path into within the limits of 0.5mm - 1.2mm.

[Claim 3] The manufacture approach of the magnetic-recording medium according to claim 1 characterized by considering the amount of circulating flow of the above-mentioned sand mill as a part for part [ for 131./- ], and 201./.

[Claim 4] The manufacture approach of the magnetic-recording medium according to claim 1 characterized by the above-mentioned particle fine particles being magnetic fine particles.

[Claim 5] The manufacture approach of a magnetic-recording medium according to claim 4 that the above-mentioned magnetic fine particles are characterized by being metal magnetism fine particles of 0.20 micrometers or less of major-axis length.

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**DETAILED DESCRIPTION**

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[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention is concerned with the manufacture approach of a magnetic-recording medium.

[0002]

[Description of the Prior Art] In recent years, the formation of high density record by the magnetic-recording medium is more prosperous still, and the needs of thin-film-izing of the magnetic layer coating thickness in a spreading mold magnetic-recording medium are increasing. For this reason, twist atomization of the magnetic powder which is the bearer of magnetic recording, about 0.20 micrometers or less, for example, 0.15 micrometers, or atomization not more than this is advanced. Therefore, as for manufacture \*\*\*\*\* of a magnetic coating, randomization of the distributed technique of the magnetic coating containing these particle magnetism powder is becoming important in manufacture of the magnetic-recording medium of high density record.

[0003] Moreover, when the magnetic layer which aims at homogeneity spreading of not only a magnetic coating but a magnetic paint film, and forms a nonmagnetic paint film in a lower layer and which has two-layer structure, for example is formed, also about the nonmagnetic coating used for the lower layer paint film, the atomization is required and the distributed technique of the nonmagnetic powder accompanying this is important. Usually, although manufacture of these magnetism coating or a nonmagnetic coating kneads mixing of particle powder, a binder, etc. by the extruder and is performing distribution by the sand mill, more, with atomization, it is the thing of particle powder for which phase dilution is performed at the time of processing by the extruder, and the approach of maintaining coating stability is taken.

[0004]

[Problem(s) to be Solved by the Invention] However, a sand mill process takes long duration extremely to the processing time of the sand mill of distributed particle powder according to detailed-izing more, and it is posing a big problem industrially at it. In this invention, the manufacture approach of the coating for magnetic-recording media which can distribute this detailed particle powder certainly in a short time, and the manufacture approach of the magnetic-recording medium using this further are offered.

[0005]

[Means for Solving the Problem] In the production process of the coating for magnetic-recording media which has particle fine particles and a binder at least, the manufacture approach of the magnetic-recording medium by this invention has the kneading process which kneads particle fine particles and a binder, and a subsequent distributed process, and a distributed process performs it by the sand mill from which the bead fill was selected to 40% - 70% (volume ratio).

[0006] When based on the manufacture approach of the coating for magnetic-recording media by above-mentioned this invention, it was the distributed working hours of the abbreviation 1/7 of the conventional distributed working hours, and it was stabilized and the target coating was able to be obtained. Therefore, in the manufacture approach of the magnetic-recording medium by above-mentioned this invention, shortening of the production time of the magnetic-recording medium for high density record is attained.

[0007]

[Embodiment of the Invention] Although it has the kneading process which kneads particle fine particles and a binder, and a subsequent distributed process in the production process of the coating for magnetic-recording media which has particle fine particles and a binder at least as the manufacture approach of the magnetic-recording medium by this invention was mentioned above Especially in this invention, the distributed process selects preferably 40% to 70% to 50% - 60% (rate to the content volume of the bead to which all perform a volume ratio, i.e., distribution which is mentioned later), and a bead fill carries out by the sand mill. When shortening of distributed working hours was not fully attained and the bead fill exceeded 70% at less than 40%, a bead fill came to make this preferably 50% - 60% 40% to 70% by spoiling the target dispersion effect.

[0008] And as for that diameter of a bead, it is desirable to consider as within the limits of 0.5mm - 1.2mm, and, as for the amount of circulating flow of the sand mill in this distributed process, it is desirable to consider as a part for part [ for 131./- ] and 201./-. If will be hard coming to generate a dispersion effect if the diameter of a bead is not much small, shortening of distributed working hours is no longer attained fully if the diameter of a bead is not much large, a dispersion effect is low when this is not much small also about the amount of circulating flow of a sand mill, and it is not much large, it will be based on processing becoming impossible.

[0009] Particle fine particles are magnetic fine particles, when the coating made into the purpose is a magnetic coating, and these magnetic fine particles are things from which it had become a problem by the conventional approach to require time amount great to distribution and which perform that distribution, for example in particle magnetism fine particles of 0.20 micrometers or less of major-axis length.

[0010] The same magnetic fine particles, a binder, etc. can be used with the component of a magnetic coating being conventionally well-known. If it illustrates, the ferromagnetic metal particles which consist of alloy ingredients, such as various charges of a ferromagnetic alloy which use Fe, Co, and nickel, such as ferromagnetic metallic materials, such as Fe, Co, and nickel, Fe-Co and Fe-nickel, Fe-Co-nickel, Co-nickel, Fe-Mn-Zn, Fe-nickel-Zn, Fe-Co-nickel-Cr, Fe-Co-nickel-P, Fe-Co-B, Fe-Co-Cr-B, and Fe-Co-V, as a principal component, Mn-Bi, and Mn-aluminum, as magnetic fine particles are suitable. Moreover, elements, such as aluminum, Si, Ti, Cr, Mn, Cu, Zn, Mg, and P, may be added by these for the purpose of various property improvements. moreover, gamma-Fe 2O<sub>3</sub>, Co content gamma-Fe 2O<sub>3</sub>, Fe 3O<sub>4</sub>, Co content gamma-Fe 3O<sub>4</sub>, Co covering gamma-Fe 3O<sub>4</sub>, and CrO<sub>2</sub> etc. -- you may be conventionally well-known oxide magnetism fine particles.

[0011] Moreover, as a binder, polymers, such as a vinyl chloride, vinyl acetate, vinyl alcohol, acetic-acid vinylidene, acrylic ester, methacrylic ester, styrene, a butadiene, and acrylonitrile, or the copolymer which combined these two or more sorts, polyurethane resin, polyester resin, an epoxy resin, etc. can be used. It is suitable to use a vinyl system copolymer, a polyester-polyurethane system copolymer, a polycarbonate-polyurethane system polymer, a nitrocellulose, etc. especially.

[0012] moreover, as a solvent for distributing these magnetism fine particles and a binder Ketone systems, such as an acetone, a methyl ethyl ketone, methyl isobutyl ketone, and a cyclohexanone, ethyl acetate, methyl acetate, ethyl lactate, and acetic-acid GURIKORUMONOECHIRUETERU \*\* and the ester system to obtain -- Glycol ether systems, such as glycol wood ether, the glycol monoethyl ether, and dioxane, Chlorinated hydrocarbon, such as aliphatic hydrocarbon, such as aromatic hydrocarbon, such as benzene, toluene, and a xylene, a hexane, and a heptane, a methylene chloride, ethylene chloride, a carbon tetrachloride, chloroform, ethylene chlorohydrine, and dichlorobenzene, etc. is mentioned.

[0013] Furthermore, in a magnetic coating, a dispersant, lubricant, an abrasive material, an antistatic agent, a rust-proofer, etc. can be added as an additive.

[0014] Moreover, need \*\*\*\*\*, a back coat layer, a topcoat layer, etc. can be formed in the nonmagnetic base material which constitutes a magnetic-recording medium other than a magnetic layer. In this case, membrane formation conditions, such as a back coat layer and a topcoat layer, are not limited especially that what is necessary is just the approach by which optimum dose is usually carried out to the manufacture approach of this kind of magnetic-recording medium.

[0015] Next, an example of the operation gestalt of 1 of this invention is explained with reference to drawing 1 R> 1 and drawing 2. Drawing 1 shows the outline block diagram of an example of the manufacturing installation of a coating which enforces this invention approach, and drawing 2 shows the outline block diagram of an example of sand mill equipment which performs the distribution.

[0016] This manufacturing installation has the raw-material feed zone 1, and the continuous system kneading dilution equipment 2 of a biaxial mold, churning equipment 3, a storage tank 4, a sand mill 5 and the coater 7 of the coating to the nonmagnetic base material 6, and changes. In the feeding section 1, the raw material which constitutes the pre mixed so-called coating is held, and constant feeding of the future raw material is carried out to kneading dilution equipment 2. Kneading dilution equipment 2 has kneading section 2A of the preceding paragraph, and latter dilution kneading section 2B, and sets them to dilution kneading section 2B. Feed zone 2C of the solvent for dilution is prepared, and changes. Kneading dilution equipment 2 from the feeding section 1 the supplied raw material It is kneaded in kneading section 2A of the preceding paragraph, and kneading is made while dilution is made with the solvent for dilution further supplied from feed zone 2C of the solvent for dilution in latter dilution kneading section 2A. Thus, the coating paste with which kneading was made and formed is supplied to churning equipment 3, a methyl-ethyl-ketone:toluene:cyclohexanone is the mixed solvent of 5:3:2, and is about 2 hours, for example, an AUW ratio, and is agitated [ solid content dilutes it to 31.0 % of the weight, and ].

[0017] This agitated coating is supplied to a storage tank 4. The coating with which the circuit 8 was formed with the pump (not shown) and this storage tank 4 and sand mill 5 were supplied to the storage tank 4 is supplied to a sand mill 5, distributed processing is made here, and the process of being returned to a storage tank 4 is repeated. And the coating

with which this activity was made is sampled and supplies the coating with which necessary distribution was made to coating feed zone 7A of a coater 7. In a coater 7, the nonmagnetic base material 6 is made as [ shift / to the rolling-up roll 10 / from the supply roll 9 ], and spreading of the coating to the nonmagnetic base material 6 is made by coating feed zone 7A in the shift way.

[0018] As the so-called large flow rate mold sand mill is used, for example, a sand mill 5 is shown in drawing 2. In the vessel 11 of the shape of a cylinder which has feed hopper 11a of a coating, the rotation shaft 13 which has a disk 12 is formed. A disk 12 by rotation of the rotation shaft 13. For example, the bead of the specified quantity which rotates with the peripheral speed of 10m/second, and exists in vessel 11 by this rotation. While a distributed-processing object, i.e., a coating, is agitated and very-fine-particle-izing and distribution are performed by a collision and high speed shearing of these beads and a processing object. It is sent to the output port 11b side by which the separation screen 14 has been arranged, and it dissociates with a bead and a processing object, i.e., a coating, is taken out from this output port 11b to a circuit 8.

[0019] Thus, although the coating made into the purpose by which necessary distribution was made, for example, a magnetic coating, is produced, the coater 7 which this mentioned above is supplied, and spreading to the nonmagnetic base material 6 is made and not being illustrated, desiccation, orientation, and the magnetic-recording medium that calender processing is made and is made into the purpose are manufactured.

[0020] Next, although an example is given and the manufacture approach of the magnetic-recording medium by this invention is explained, this invention is not limited to this example.

[0021] [an example 1] -- the paste (50.3% of solid content) which carried out kneading processing, carried out the raw material (85 % of the weight of solid content) of the following presentation in this way, and obtained it in this example with the biaxial mold continuous system kneading dilution equipment 2 explained by drawing 1 -- the methyl-ethyl-ketone:toluene:cyclohexanone diluted with the AUW ratio and solid content diluted with churning equipment 3 to 31.0 % of the weight with the mixed solvent of 5:3:2 for 2 hours.

Presentation of the coating obtained with kneading dilution equipment 2 : Metal magnetism fine particles (0.1 micrometers of major-axis length) The 100.0 weight sections A vinyl chloride system copolymer The 10.0 weight sections A citric acid The 3.0 weight sections A cyclohexanone The 24.6 weight sections A methyl ethyl ketone Ingredient presentation supplied to the 87.0 weight sections above-mentioned coating with churning equipment 3 : A vinyl chloride system copolymer The 2.5 weight sections Fatty acid ester (lubricant) The 7.0 weight sections Cyclohexanone The 30.2 weight sections Methyl ethyl ketone The 50.0 weight sections Toluene Distributed processing of the 200l. of the magnetic coatings produced by the presentation and approach which carried out 82.0 weight sections \*\*\*\* was carried out on the following sand mill conditions by the above-mentioned sand mill 5.

Sand mill conditions : The amount of circulating flow By 17l./, a bead The diameter of a zirconia-beads bead It samples for every time amount. the 0.7mm bead fill (rate to content volume of vessel 11 (the following -- the same)) 70% above-mentioned sand mill conditions -- a sand mill -- carrying out -- circulation processing -- on the way -- with a coater 7 It evaluated by applying by 5.5 micrometers in thickness on the nonmagnetic base material 6 of the shape of a film by polyethylene terephthalate with a thickness of 20 micrometers, and producing a magnetic tape, i.e., a magnetic-recording medium, respectively.

[0022] [Example 2] Sand mill conditions were changed in the example 1, and the magnetic tape was produced like the example 1 by the same presentation and same approach as an example 1 using the coating sampled for every time amount, respectively, respectively.

Sand-mill conditions: The amount of circulating flow It is a bead by 17l./ Diameter of a zirconia-beads bead 0.7mm

bead fill 60% [0023] [Example 3] Sand mill conditions were changed in the example 1, and the magnetic tape was produced using the coating sampled for every time amount by the same presentation and same approach as an example 1, respectively.

Sand-mill conditions: The amount of circulating flow It is a bead by 17l./ Diameter of a zirconia-beads bead 0.7mm

bead fill 50% [0024] [Example 4] Sand mill conditions were changed in the example 1, and the magnetic tape was produced using the coating sampled for every time amount by the same presentation and same approach as an example 1, respectively.

Sand-mill conditions: The amount of circulating flow It is a bead by 17l./ Diameter of a zirconia-beads bead 0.7mm

bead fill 40% [0025] [Example 5] Sand mill conditions were changed in the example 1, and the magnetic tape was produced by the same presentation and the same approach using the example 1 and the coating sampled for every time amount, respectively.

Sand-mill conditions: The amount of circulating flow It is a bead by 17l./ Diameter of a zirconia-beads bead 0.5mm

bead fill 60% [0026] [Example 6] Sand mill conditions were changed in the example 1, and the magnetic tape was produced using the coating sampled for every time amount by the same presentation and same approach as an example 1, respectively.

Sand-mill conditions: The amount of circulating flow It is a bead by 17l./ Diameter of a zirconia-beads bead 1.0mm

bead fill 60% [0027] [Example 7] Sand mill conditions were changed in the example 1, and the magnetic tape was produced using the coating sampled for every time amount by the same presentation and same approach as an example 1, respectively.

Sand-mill conditions: The amount of circulating flow It is a bead by 17l./ Diameter of a zirconia-beads bead 1.2mm bead fill 60% [0028] [Example 8] Sand mill conditions were changed in the example 1, and the magnetic tape was produced using the coating sampled for every time amount by the same presentation and same approach as an example 1, respectively.

Sand-mill conditions: The amount of circulating flow It is a bead by 20l./ Diameter of a zirconia-beads bead 0.7mm bead fill 60% [0029] [Example 9] Sand mill conditions were changed in the example 1, and the magnetic tape was produced using the coating sampled for every time amount by the same presentation and same approach as an example 1, respectively.

Sand-mill conditions: The amount of circulating flow It is a bead by 15l./ Diameter of a zirconia-beads bead 0.7mm bead fill 60% [0030] [Example 10] Sand mill conditions were changed in the example 1, and the magnetic tape was produced using the coating sampled for every time amount by the same presentation and same approach as an example 1, respectively.

Sand-mill conditions: The amount of circulating flow It is a bead by 13l./ Diameter of a zirconia-beads bead 0.7mm bead fill 60% [0031] [Example 11] It changed to the metal magnetism fine particles in an example 1, and coating production was performed using 0.15 micrometers of major-axis length. and the paste (45.3% of solid content) which carried out kneading processing, carried out the raw material (72 % of the weight of solid content) of the following presentation in this way, and obtained it in this example with the biaxial mold continuous system kneading dilution equipment 2 explained by drawing 1 -- the methyl-ethyl-ketone:cyclohexanone diluted with the AUW ratio and solid content diluted with churning equipment 3 to 38.2 % of the weight with the mixed solvent of 2:1 for 2 hours.

Presentation of the coating obtained with kneading dilution equipment 2: Nonmagnetic iron-oxide  $\alpha$ -Fe<sub>2</sub>O<sub>3</sub> (0.15 micrometers of major-axis length)

The 100.0 weight sections A vinyl chloride system copolymer The 17.0 weight sections Carbon The 12.0 weight sections A citric acid The 2.0 weight sections A cyclohexanone The 57.0 weight sections Methyl ethyl ketone The 101.0 weight sections Ingredient presentation supplied to the above-mentioned coating with churning equipment 3 : Vinyl chloride system copolymer The 17.0 weight sections Fatty acid ester (lubricant) The 7.0 weight sections Cyclohexanone The 27.0 weight sections methyl ethyl ketone Distributed processing of the 200l. of the nonmagnetic coatings produced by the presentation and approach which carried out 66.0 weight sections \*\*\*\* was carried out on the following sand mill conditions by the above-mentioned sand mill 5.

Sand-mill conditions: The amount of circulating flow It is a bead by 17l./ Diameter of a zirconia-beads bead 0.7mm bead fill In the middle of 60% circulation processing, it sampled for every time amount, and with the coater 7, on the nonmagnetic base material 6 of the shape of a film by polyethylene terephthalate with a thickness of 20 micrometers, it applied by 5.5 micrometers in thickness, the lower layer film was formed, the magnetic coating was applied on this, and the magnetic tape was produced. In this case, since the magnetic layer formed on this is affected at front-face nature when the particle diameter of nonmagnetic powder is large, it is desirable to be referred to as 0.15 micrometers or less also in the particle diameter of nonmagnetic powder.

[0032] [Example of a comparison] Sand mill conditions were changed in the example 1, by the same presentation and same approach as an example 1, the coating was sampled for every working hours and the magnetic tape was produced, respectively.

Sand-mill conditions: The amount of circulating flow It is a bead by 7.0l./ Diameter of a glass bead bead 1.2mm bead fill According to the 70% above-mentioned sand mill conditions, in the middle of circulation processing, the sand mill was performed, it sampled for every time amount, and it applied by 5.5 micrometers in thickness on the nonmagnetic base material 6 of the shape of a film by polyethylene terephthalate with a thickness of 20 micrometers, the magnetic tape, i.e., a magnetic-recording medium, was produced, and the front face was evaluated by the coater 7.

[0033] When the circulation ring current became above by 7.0l./at this time, the pressure in a sand mill rose and it became processing impossible. Therefore, it considered as a part for 7.0l./which is the peak price of the flow rate which can be processed.

[0034] The glossiness (gross) which serves as operation time (distributed working hours) of a sand mill and an index of the dispersibility of a magnetic layer about each example and the example of a comparison, and each measurement result of a remanence ratio Rs are shown in following each table. namely, the result of examples 1-4 -- Table 1 -- the result of examples 5-7 -- Table 2 -- moreover, the result of examples 8-10 -- Table 3 -- the result of an example 11 -- Table 4 -- the result of an example 12 -- Table 5 -- moreover, the result of the example of a comparison is shown in Table 6. Here, about the remanence ratio Rs, it measured using the sample oscillatory type magnetometer (VSM Toei industrial company make). Glossiness serves as an index of the dispersibility of a magnetic layer, and was measured at 45 degrees of incident angles with the gross meter (Nippon Denshoku Co., Ltd. make).

[0035]

[Table 1]

(ビーズの充填量をパラメータとした場合)

運転 時間 (hr)	実施例1-70%充填		実施例2-60%充填		実施例3-50%充填		実施例4-40%充填	
	グロス (%)	R <sub>s</sub> (%)	グロス (%)	R <sub>s</sub> (%)	グロス (%)	R <sub>s</sub> (%)	グロス (%)	R <sub>s</sub> (%)
1	212.4	82.0	203.0	76.5	198.2	75.2	180.5	75.4
2	247.5	83.5	211.6	81.5	205.3	78.4	188.2	78
3	252.7	84.0	225.0	83.1	211.0	80.5	200.3	79.8
4	258.8	84.2	248.6	83.6	218.0	82.6	205.5	80.8
5	287.5	84.4	258.2	84.5	232.9	83.8	212.1	82.3
6	268.5	84.5	265.1	85.2	244.1	84.5	225.9	84.2
7	268.4	85.1	267.5	85.8	248.2	85.0	235.6	84.8
8	※269.5	※88.2	268.9	86.6	248.5	84.9	248.8	85.2
9	※269.5	85.5	269.4	※88.1	253.4	85.3	252.2	85.3
10	※269.5	82.3	※269.5	※88.2	263.9	85.8	253.8	85.5
11	269.3	82.0	※269.6	87.6	265.3	86.3	255.8	85.2
12	269.5	81.5	※269.5	85.8	268.9	87.2	262.2	85.7
13					※269.8	※88.1	264.8	88.0
14					※269.8	※88.2	265.2	88.3
15							266.8	86.9
16							267.5	88.6
17							※269.1	87.5
18							※269.0	※88.0

※は合格（分散終了）と判定したもので、グロスが連続2測定で、269.0%以上、R<sub>s</sub>は88%以上の場合。

[0036]

[Table 2]

[ビーズの径をパラメータとした場合]

運転時間 (Hr)	実施例5 -0.5 mmφ		実施例6 -1.0 mmφ		実施例7 -1.2 mmφ	
	グロス (%)	R <sub>s</sub> (%)	グロス (%)	R <sub>s</sub> (%)	グロス (%)	R <sub>s</sub> (%)
1	205.2	78.2	198.5	76.1	180.0	75.4
2	213.4	82.8	204.3	78.0	188.4	77.5
3	227.2	85.2	210.9	80.0	198.8	80.1
4	250.1	85.5	217.5	81.5	204.2	80.8
5	258.2	85.8	228.9	82.7	208.0	82.0
6	266.5	86.1	238.7	83.6	223.5	84.2
7	268.9	87.4	243.0	84.4	232.1	84.9
8	※269.2	※88.2	246.8	84.8	245.9	85.6
9	※269.4	※88.0	250.6	85.1	252.0	85.8
10	※269.5	87.3	255.5	85.4	253.8	86.0
11	※269.4	86.7	260.5	85.8	256.2	86.1
12	※269.5	85.0	265.8	86.4	264.5	86.5
13			267.4	87.1	264.3	86.8
14			※269.2	87.4	264.6	86.9
15			※269.6	※88.1	266.8	87.2
16					268.2	87.6
17					269.0	87.8
18					※269.0	※88.0

※は合格（分散終了）と判定したもので、グロスが連続2測定で、269.0 %以上、R<sub>s</sub>は88%以上の場合。

[0037]

[Table 3]

[循環流量をパラメータとした場合]

運転時間 (Hr)	実施例8 -20リットル/min		実施例9 -15リットル/min		実施例10 -13リットル/min	
	グロス (%)	R <sub>s</sub> (%)	グロス (%)	R <sub>s</sub> (%)	グロス (%)	R <sub>s</sub> (%)
1	205.4	78.2	200.0	75.7	197.5	74.1
2	215.7	82.4	211.3	79.0	203.0	75.9
4	250.8	84.0	245.2	80.6	238.7	78.3
6	267.5	86.7	255.7	83.2	245.8	80.7
8	※269.3	※88.2	264.2	85.9	253.9	83.2
10	※269.5	※88.2	266.1	87.8	258.0	85.0
12	※269.4	※88.3	※269.4	※88.2	263.4	86.2
14			※269.4	※88.3	267.8	87.3
16					※269.5	87.9
17					※269.3	※88.2
平均 Pass回数	60 Pass/10Hr		63 Pass/14Hr		66.3 Pass/17Hr	
平均 滞留時間	35.7 分		49.98分		60.60分	

※は合格（分散終了）と判定したもので、グロスが連続2測定で、269.0 %以上、R<sub>s</sub>は88%以上の場合。

[0038]



[Table 4].

[磁性粉体を用いた場合]

運転時間 (Hr)	実施例11-長軸長0.15 $\mu$ m	
	グロス (%)	R s (%)
1	120.0	78.2
2	173.4	84.5
4	213.1	86.2
6	225.2	86.8
8	230.2	87.5
10	235.5	87.9
12	※ 235.6	※ 88.0

※は合格(分散終了)と判定したもので、  
グロスが連続2測定で、235.0 %以上、  
R s は88%以上の場合。

[0039]

[Table 5]

運転時間 (Hr)	実施例12 -非磁性0.15 $\mu$ m
	グロス (%)
1	112.2
2	132.0
4	146.3
6	149.5
8	151.0
10	152.0
12	153.5
14	154.4
16	※ 155.2
18	※ 155.2

※は合格(分散終了)と判定したもので、グロスが連続2測定で、155.0 %以上の場合。

[0040]

[Table 6]

運転時間 (hr)	比較例	
	グロス (%)	R s (%)
1	54.5	76.3
2	70.2	76.5
4	90.9	77.4
6	110.8	77.6
8	155.6	77.9
10	180.2	78.0
15	200.0	79.9
20	221.0	82.3
25	230.5	84.2
30	245.2	85.1
35	253.2	85.9
40	260.3	86.5
45	267.5	86.8
50	268.1	87.2
55	268.5	87.6
60	268.5	87.8
61	268.8	87.7
62	268.7	87.8
63	269.0	87.9
64	269.0	87.9
65	※ 269.0	※ 88.0

※は合格（分散終了）と判定したもので、  
グロスが連続2測定で、269.0 %以上、  
R s は88%以上の場合。

[0041] When Tables 1-3 are seen, and a bead fill selects the conditions of a sand mill to 50% - 60% preferably 40% to 70% so that clearly, When setting the path phi of a bead to 0.5mm - 1.2mm and considering the amount of circulating flow as a part for part [ for 131./- ], and 201./, It turns out that that by which the operation time of the conventional sand mill had reached the distribution from which the target distribution, i.e., a gross, becomes 269.0% or more by continuation 2 measurement, and Rs becomes 88% in dozens of hours or more can be shortened in less than 20 hours.

[0042] Moreover, it turns out that the distribution from which the distribution made into the purpose, i.e., a gross, becomes 235.0% or more by continuation 2 measurement so that clearly from Table 4 when major-axis length uses 0.15-micrometer magnetic fine particles 0.20 micrometers or less, and Rs becomes 88% can be obtained by the short-time activity of 12 hours. furthermore, as shown in Table 5, to the lower layer non-magnetic layer of the magnetic layer in the magnetic-recording medium in an example 12, it could be alike, it was able to set, and distributed time amount (operation time) which can make the dispersibility made into the purpose, i.e., front-face nature, 155.0% or more was able to be made into about 16 hours. Incidentally, in the former, although dispersibility of this level is acquired, 60 hours was required.

[0043] And when distributing a magnetic coating as in the example of a comparison, in order for the gross made into the purpose mentioned above as a magnetic layer to obtain by the conventional approach, and for Rs to obtain 88% or more 269.0% or more, the bottom (operation time) is required at the time of distribution of 60 hours or more.

[0044] In the manufacture approach of the magnetic-recording medium by this invention, as compared with the former, it is the distributed process of a coating, and the formation time amount of the coating in the manufacture process can be compared with the conventional duration, for example, shortening [ as / in the above-mentioned example 5 ] which attains to one seventh can be attained so that clearly [ mentioned / above ] from \*\*.

[0045] In addition, in examples 1-11, although it is the case where a magnetic layer considers as the monolayer structure by the magnetic paint film, shortening of distribution can be further attained by forming a magnetic layer on

this, for example by using the non-magnetic layer of an example 12 as a lower layer, respectively to obtain necessary front-face nature.

[0046]

[Effect of the Invention] As mentioned above, the magnetic layer which the magnetic fine particles or nonmagnetic fine particles which it stabilized and atomized by the distributed working hours of the abbreviation 1/7 of the conventional distributed working hours makes the purpose distributed good, or since the lower layer non-magnetic layer can be obtained, for example, according to the manufacture approach of the magnetic-recording medium by this invention, improvement in mass-production nature and reduction-ization of cost can be attained.

[0047] Moreover, according to the manufacture approach of the magnetic-recording medium by above-mentioned this invention, since the magnetic layer which was stabilized good with shortening of the process time amount of the coating, and it atomized can be obtained, the mass-production nature of the magnetic-recording medium of a spreading mold excellent in the magnetic parametric performance can be improved, and reduction-ization of cost can be attained.

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[Translation done.]